

Abstract

In the horticultural industry one of the problems which operators have to face, in the ebb and flow fertigation system and especially in the warm climate periods, is the reduction of the dissolved oxygen content in the nutrient solution due to high temperature. This fact is considered responsible of some problems in the cultivation of cold-climate species.

Another aspect concerns the choice of the most appropriate irrigation variables (e.g. volume and irrigation intervals) that too often are based on personal knowledge of the operator and rarely reflect the actual crop water requirements. This leads to an inevitable waste of water resource.

At the Chiara and Peron companies four experiments were conducted in which, in the ebb and flow irrigation systems, the effects of a nutrient solution not conditioned were compared to those of a oxygenated nutrient solution by means of pure oxygen injection. In the experiments were used different series of cyclamen and different colors were also evaluated. Depending on the series, different diameter of pot was used which involved different length of crop cycles. The results obtained showed that the simple injection of oxygen is effective in raising the oxygen content of the nutrient solution. However, plant response to treatments was not always satisfactory. In fact, rarely the observed differences in the values of the different parameters were significantly different and not always, however, in favor of the oxygenation treatment.

At the farm of the University of Padua, in an ebb and flow irrigation systems to, the effects of a not conditioned nutrient solution were compared to those of an aerated one, by the injection of air, and or a chilled nutrient solution. In the third year, the first two treatments were compared to a nutrient solution that was both aerated and chilled. The first series of experiments has shown that the aeration is able to improve the oxygen content but in little extent. The refrigeration, obviously, lowered the temperature of the nutrient solution, but it did not always permit the maintenance of a satisfactory concentrations of oxygen. Treatments had some effects on cyclamen plant growth, but they were of limited relevance (e.g. a different partition of dry matter, among treatments, with increased production of roots in the chilled treatment than the others in the first experiment, a higher growth index with the aerated solution, a greater growth of the corm with refrigeration and increased biomass of the aerial part with both aerated and refrigerated treatments). The third year of experiments showed that the combined effect of the aeration and refrigeration treatments produces a significant increase of oxygen in the nutrient solution. In this experiment, however, at least in part due to the particularly mild climate, the differences observed in terms of growth of plants, were very, very little. As the improvements achieved in these experiences, both oxygenation or aeration, and cooling of the nutrient solution, at present, do not seem to justify the additional expenses that treatments involve.

In 2013 and 2014, at the farm of the University, two other experiments were carried out. They were aimed at evaluating the effects of different length of irrigation intervals on both cyclamen growth and water use reduction. The lengthening of the irrigation interval of a plant of cyclamen, which demonstrated to be a very tolerant to substrate dehydration, reduced growth of plants but did not compromise their marketability. Only in cases of very low irrigation frequency, for instance when irrigation occurred when substrate water content dropped below 40% water holding capacity, the market value seemed reduced. However, this approach allowed to sensibly reduce the use of irrigation water. As the water use absorbed by the pots increased along with the lengthening of the irrigation intervals, however, the reduction of water use was inferior to what would be expected.